



SOLAR ADEPT

EFFICIENT SOLAR ENERGY SYSTEMS

PROJECTS:	7	FUNDING YEAR:	2011
TOTAL INVESTMENT:	\$14.7 million	PROGRAM DIRECTOR:	Dr. Tim Heidel
PROJECT DETAILS:	www.arpae.energy.gov/ProgramsProjects		

PROGRAM

The 7 projects that make up ARPA-E's Solar ADEPT program, short for "Solar Agile Delivery of Electrical Power Technology," aim to improve the performance of photovoltaic (PV) solar energy systems, which convert the sun's rays into electricity. Solar ADEPT projects are integrating advanced electrical components into PV systems to make the process of converting solar energy to electricity more efficient.

INNOVATION NEED

Only a small percentage of the sunlight that reaches a PV system is converted into useful electricity. This inefficiency is due in part to the inefficient and failure-prone electrical components used in most PV systems today.

Improving the performance and lowering the cost of electrical components, such as semiconductors and transformers, would go a long way towards improving the performance of PV systems. Better performing PV systems would, in turn, help make solar energy cost competitive with conventional forms of electricity generation.

A PV system component called an inverter takes electric current from a PV cell and converts it into the type and amount of electricity that is compatible with the power grid. Power conversion is a critical part of the process because electrons in the PV cell create a direct current, or DC power, but electrical power grids that provide electricity to homes and other buildings require alternating current, or AC power.

POTENTIAL IMPACT

If successful, the Solar ADEPT projects would improve the efficiency of several steps involved in the process of converting solar energy to useable electricity—reducing the cost of utility-scale PV systems by up to 50% and residential or small-scale systems by up to 80%.

- **SECURITY:** Lowering the cost of PV systems would help increase the use of solar energy, which in turn would decrease our dependence on fossil fuels and improve U.S. energy security.
- **ENVIRONMENT:** Solar energy systems create zero harmful emissions while providing energy to homes and businesses, so their widespread use would significantly improve air quality.
- **ECONOMY:** Solar ADEPT project innovations could help position the U.S. as a leader in the solar electronics industry.
- **JOBS:** Widespread use of residential and commercial PV systems would create jobs for system installers, technicians, and sales people.

SOLAR ADEPT GOALS

- Increase the efficiency of solar energy systems
- Reduce the size of PV components and systems
- Make solar energy cost competitive with conventional electricity generation